

## Belkin N750 DB Wireless Dual-Band N+ Router 802.11n and WAN Routing Performance vs. Comparable Routers

### EXECUTIVE SUMMARY

As the number of Wi-Fi devices in the home grows, new applications on those devices are driving the demand for network bandwidth ever higher. Belkin's new line of Wi-Fi routers are focused on maximizing the bandwidth available for user applications and delivering a superior user experience from any point in the house.

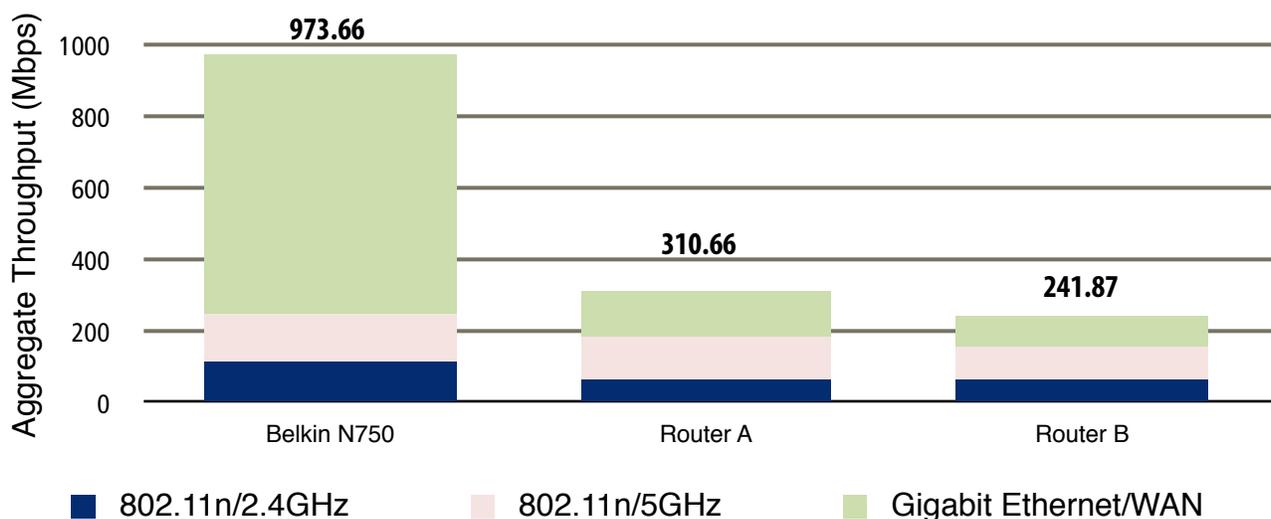
Belkin commissioned Tolly to benchmark the performance of its wireless LAN (WLAN) router in an actual residence and compare that performance against comparable products from other leading home networking vendors. All tests for a given benchmark were run on the same day to minimize variability from environmental factors, all results reported are the average of the four router orientations. For WAN-LAN throughput tests, wireless clients were placed 15 feet from the router in order to simulate a high processing burden on the router.

### THE BOTTOM LINE

Belkin's N750 Dual-Band Router provides:

- 1 Up to 900 Mbps combined throughput from WAN-to-LAN, LAN-to-WLAN, and WLAN-to-LAN
- 2 2X faster concurrent Wi-Fi and WAN than competing routers
- 3 Up to 42% faster 2.4GHz and 5GHz Wi-Fi performance than competing routers
- 4 Up to 93% faster WAN downloads than competing routers
- 5 Consistent WLAN performance even when handling WAN traffic loads

**Belkin N750 DB WLAN Router 802.11n Close-Range Performance vs. Comparable Routers**  
Simultaneous Bidirectional Throughput of 2.4GHz and 5GHz Bands with WAN Port Download Traffic  
(as reported by Ixia IxChariot v7.10 SP3)



Source: Tolly, May 2011

Notes: WAN port was Gigabit Ethernet, measured unidirectional traffic from WAN to LAN. For WLAN, a single location tested at 15ft.

Figure 1



# Test Results

The Belkin N750 DB is a dual-band 2.4GHz/5GHz 802.11n wireless LAN (WLAN) router and was tested along with two comparable routers in an actual, active residence with the WLAN client station positioned 15 feet from the router with no walls in the signal path.

The Belkin N750 delivered the highest average aggregate throughput in all tests. See Table 1.

## WLAN Plus WAN Performance

This test scenario illustrated the overall throughput of the router when processing download traffic across the WAN port while also processing

bidirectional traffic across both WLAN bands.

The Belkin N750 delivered the highest average aggregate throughput for each test component as well as for all components combined. See Figure 1.

In the WLAN 2.4GHz test, Belkin delivered over 113 Mbps of throughput which was nearly 1.8 times the throughput of the competing routers which each delivered 64 Mbps.

In the WLAN 5GHz test, Belkin delivered over 135 Mbps of throughput which was 15 Mbps more than the closest competitor and 1.45 times the throughput of the trailing router which delivered 93 Mbps.

Across the Gigabit Ethernet/WAN interface, the results were dramatically different across the products tested.

**Belkin International, Inc.**

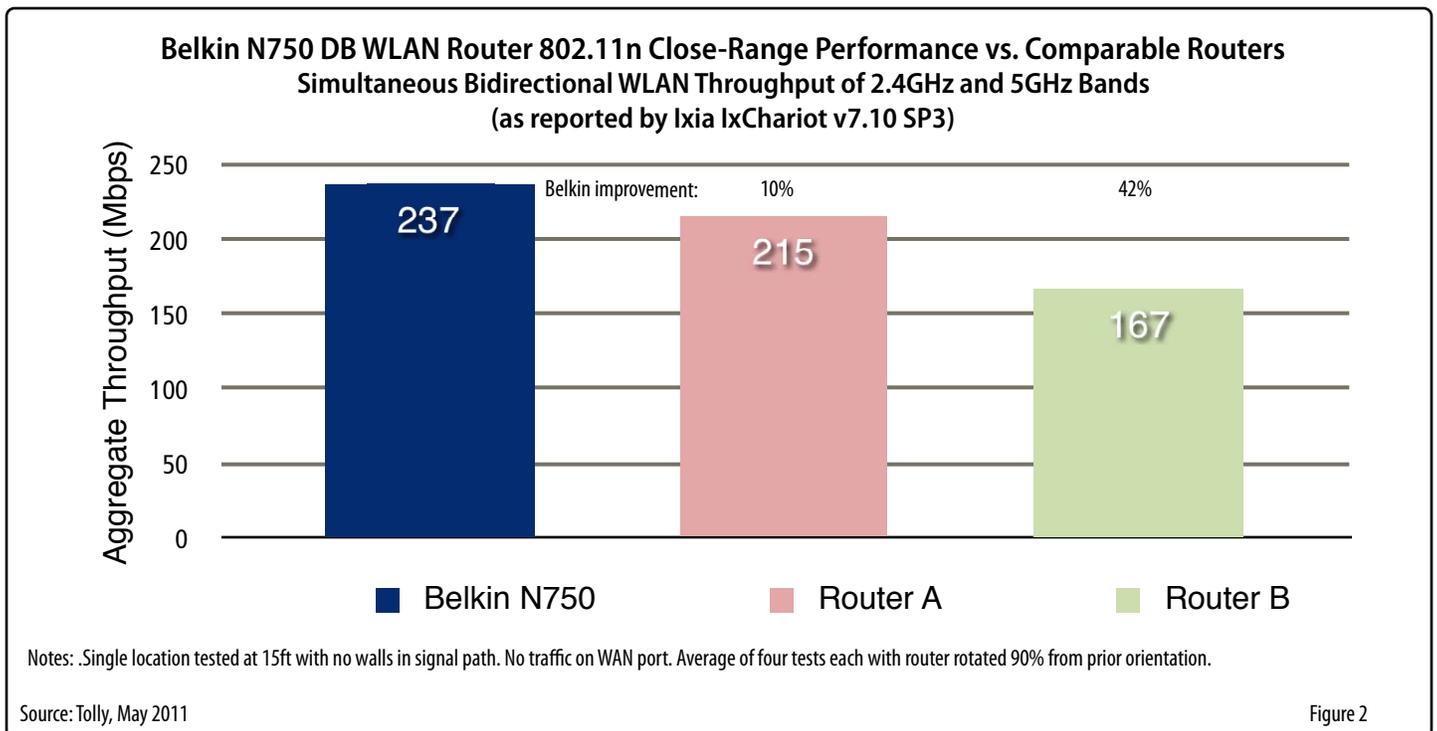


**Belkin N750 DB**

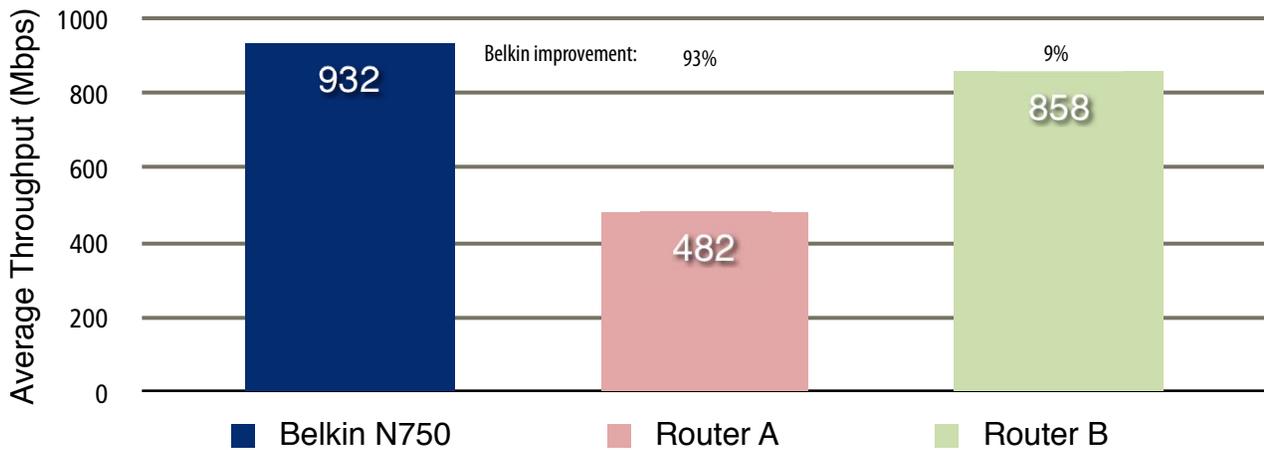
**802.11n WLAN Performance**

*Tested May 2011*

The Belkin N750 delivered 725 Mbps of throughput. This was more than 5.7 times the throughput of the nearest competitor which delivered 127 Mbps and more than 8.5 times the throughput of the trailing router which delivered 84.78 Mbps.



**Belkin N750 DB WLAN Router 802.11n WAN-to-LAN Performance vs. Comparable Routers**  
 Unidirectional WAN to LAN Throughput across Gigabit Ethernet WAN Port  
 (as reported by Ixia IxChariot v7.10 SP3)



Source: Tolly, May 2011

Figure 3

Belkin’s overall throughput of 973.66 Mbps was more than 3 times the throughput of the nearest competitor which delivered an aggregate of 310.66 Mbps and more than 4 times the throughput of the trailing router which delivered an aggregate of 241.87 Mbps.

### WLAN Performance

This test scenario illustrated the throughput of the router when processing traffic across both WLAN bands.<sup>1</sup>

The Belkin N750 delivered the highest average aggregate throughput. See Figure 2.

Belkin delivered over 237 Mbps of combined 2.4GHz/5GHz WLAN of throughput which was 22 Mbps greater than the nearest competitor and more

than 1.4 times the throughput of the trailing router which each delivered 167 Mbps.

### WAN-to-LAN Performance

This test scenario illustrated the throughput of the router when processing unidirectional “download” traffic across the router’s Gigabit Ethernet/WAN port to one of its Gigabit Ethernet LAN ports.

The Belkin N750 delivered the highest average aggregate throughput. See Figure 3.

Belkin delivered 932 Mbps of throughput which was 74 Mbps greater than the nearest competitor and nearly twice the throughput of the trailing router which each delivered 482 Mbps.

## Test Setup & Methodology

### Test Setup

The testing effort evaluated the performance of three WLAN routers. The Dual Band N750 class utilizes a total of 5 antennas - 2 in the 2.4GHz spectrum and 3 antennas in the 5GHz spectrum, providing a maximum theoretical throughput of 750Mbps. The Belkin N750 ran firmware version 1.00.06.

All comparable devices under test were categorized into this router class based on the manufacturer specifications and were running the latest publicly available firmware supplied by the vendors as of May 19, 2011.

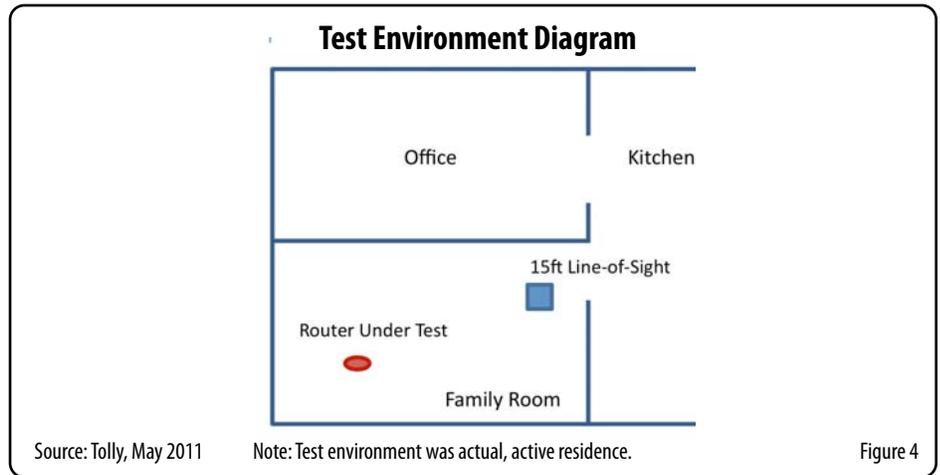
<sup>1</sup> While similar to the tests WAN plus WLAN performance tests, these tests were run on a different day and, thus, environmental conditions may have differed.

All devices were configured to have the same SSID, such that clients would automatically connect when brought online, but otherwise in their default configurations. Engineers separately configured each client to have a static IP address, though the router DHCP server remained active.

The testing consisted of taking throughput measurements of connected clients from a distance of 15 feet from the router with no intervening wall. See Figure 4.

Prior to the commencement of the performance testing, engineers performed a survey of the wireless spectrum at each test location to ensure there was not significant interference.

Results were reported using Ixia's IxChariot 7.10 SP3 console and three performance endpoints. The 5GHz client was equipped with the Intel



Centrino Ultimate-N 6300 wireless chipset (three spatial streams), running driver version 13.3.0.24, and the 2.4GHz client was equipped with the Intel WiFi Link 5100 AGN adapter (two spatial streams) running firmware 13.5.0. The wired console was connected to the device under test using a Gigabit Ethernet LAN connection. IxChariot was configured to generate two bidirectional traffic streams per radio, the reported throughput being the

sum across both radios.

### Test Methodology

For each one of the Wi-Fi routers evaluated, engineers connected the LAN port to the IxChariot console, and placed the applicable client laptop at the designated location, facing the router.

Engineers configured the tests to run for one minute, and at the conclusion of each run, the router was rotated 90 degrees clockwise, and the test was re-run. Engineers averaged the four readings to obtain the reported throughput for that location. Both the 2.4GHz and 5GHz bands were tested simultaneously and using separate client laptops two feet apart.

To generate the heavy WAN download traffic, engineers connected a wired client to the Gigabit Ethernet WAN port of each router, configuring each router's default gateway to correspond with the IP of the additional wired client. Engineers repeated the testing with the addition of the WAN to LAN traffic, and recorded the throughput.

WLAN Router Throughput (Mbps)				
Test Results Summary				
(as reported by Ixia IxChariot v7.10 SP3)				
Scenario		Device Under Test		
		Belkin N750 DB	Router A	Router B
WLAN & WAN				
	WLAN/2.4GHz	113.49	63.91	63.92
	WLAN/5GHz	135.52	119.65	93.17
	Gigabit Ethernet/WAN	724.65	127.10	84.78
	Aggregate Throughput	973.66	310.66	241.87
Dual-Band WLAN		236.50	214.85	166.74
WAN-to-LAN		931.93	482.18	857.59

Source: Tolly, May 2011      Table 1



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### Test Equipment

The Tolly Group gratefully acknowledges the provider of the benchmarking solution used in this project.

Vendor	Product	Web
Ixia	IxChariot 7.10 SP3	 <a href="http://www.ixiacom.com">http://www.ixiacom.com</a>

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